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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/530,182	08/22/2005	Ryo Kuroda	00684.003650.	5599

5514 7590 05/13/2009

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EXAMINER	
HURST, JONATHAN M	
ART UNIT	PAPER NUMBER
1797	
MAIL DATE	DELIVERY MODE
05/13/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/530,182	KURODA ET AL.	
	Examiner	Art Unit	
	JONATHAN M. HURST	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02/26/2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,5,7-11,13,16-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,5,7-11,13 and 16-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *04 April 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *02/26/2009*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 1, 2, 5, 7-11, 13, and 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Challener et al. (US 5,994,150) in view of Bozhevolnyi et al. (US 2002/0021445) further in view Lawrence et al. (US 6,642,881).

Regarding claim 1 Challener et al. discloses a sensor device for detecting a reaction of a sensor material with a specimen based on an intensity of a surface plasmon polariton wave generated by light irradiation and propagated along a surface of a sensor medium, the sensor device comprising; (See Col. 1 Lines 23-37) the sensor medium comprising a substrate, a metal film having a plurality of indentations formed on the substrate and the sensor material positioned on the metal film for reacting with the specimen, (See Fig. 3, Fig. 4, Col. 1 Lines 23-37 where there is a periodic thin film of metal, 310 or 410, with indentations surrounded by peaks, i.e. a periodic square profile and a sensor material on said film, 330 or 430)

Challenger does not specifically disclose the metal film having a plurality of openings formed on the substrate.

Bozhevolyni et al. discloses a sensing device (See [0182]) where a periodic structure comprises a plurality of openings provided in a metal film with a predetermined pitch for controlling the propagation of SPP waves. (See Abstract, [0129], and Fig. 2C where openings or holes 26 are provided in a metal film)

It would have been obvious to one of ordinary skill in the art at the time of invention to replace the plurality of indentations provided in a square profile periodic metal film with a predetermined pitch in the sensor of Challener with the plurality of openings provided in a metal film with a predetermined pitch of Bozhevolyni et al. because a predetermined pitch pattern in a metal layer can be written as either openings or indentations (See Bozhevolyni [0129] where holes are openings) and the openings represent a functional example of a surface profile as described by Challener. (See Col. 6 Lines 8-13)

Furthermore since the prior art of Bozhevolyni et al. recognizes the equivalency of openings and indentations in a metal film in the field of devices using SPP waves, it would have been obvious to one of ordinary skill in the art at the time of the invention to replace the indentations of Challenger with the openings of Bozhevolyni et al. as it is merely the selection of functionally equivalent metal film structures recognized in the art and one of ordinary skill in the art would have a reasonable expectation of success in doing so.

Neither Challenger or Bozhevolyni specifically disclose the device wherein the openings have a size smaller than a wavelength of the irradiation light and a predetermined pitch that is substantially equal to an integral multiple of a wavelength of the surface plasmon polariton wave, and wherein the openings include adjacent two openings sandwiching a metal film portion having a length of circumstance, which is a substantially integral multiple of a wavelength of the surface plasmon polariton wave.

Lawrence et al. discloses a sensor comprising a sensor material and a periodic structure (See Col. 1 Lines 13-27 and Fig. 1) wherein the openings have a size smaller than a wavelength of the irradiation light (See Lawrence Col. 4 Lines 46-55 where when pitch is between 0.5-2.0 times the wavelength of the light the indentations are inherently smaller the wavelength) and a predetermined pitch that is substantially equal to an integral multiple of a wavelength of the surface plasmon polariton wave (See Lawrence Fig. 1 where two indentations, openings, sandwich peaks and Lawrence Col. 4 Lines 46-55 where the pitch of grating is a multiple of wavelength of a SPP wave) and wherein the openings include adjacent two openings sandwiching a metal film portion having a length of circumstance, which is a substantially integral multiple of a wavelength of the surface plasmon polariton wave. (See Lawrence Fig. 1 and Challener Fig. 4 where two indentations or openings sandwich peaks and Lawrence Col. 4 Lines 46-55 where amplitude and pitch of grating is a multiple of wavelength and Challener Col. 6 Lines 9-11 where grating is square and when an amplitude of a metal film grating has a amplitude, height, which is substantially integral multiple of a wavelength of the surface

plasmon polariton wave and the grating is square, ie all sides have an equal length, then the circumference of the metal film grating is inherently also a substantially integral multiple of said wavelength)

It would have been obvious to one of ordinary skill in the art to use the periodic structure of Lawrence in the sensor of modified Challener because the periodic structure of Lawrence fulfills the need for a surface profile of a sensor as described in modified Challener and provides a substantially similar and functional example of said surface profile. (See Challener Col. 6 Lines 4-15) Furthermore it is known in the art to alter the pitch and shape of the periodic structures of devices such as those described by Challener and Lawrence depending upon application (See Lawrence Col. 4 Lines 46-55 and Challener Col. 6 Lines 4-15) and as such one of ordinary skill in the art would reasonably be able to alter said periodic structures through routine experimentation and arrive at a configuration with a pitch having a substantially equal to an integral multiple of the wavelength of a surface plasmon polariton wave.

Regarding claim 2 modified Challener discloses all the claim limitations as set forth above as well as the sensor device wherein the sensor material is a biochemical sensor material. (See Challener Col. 1 Lines 23-37)

Regarding claim 5 modified Challener discloses all the claim limitations as set forth above as well as the sensor device wherein the openings have a slit shape, and their periodic arrangement is a one-dimensional arrangement in a surface of the metal.

(See Challener Col. 11 Lines 1-5 and Fig. 8 where grooves or slits, which contain openings as described above, have periodic arrangements which are one dimensional and see Lawrence Fig. 1 where figure shows troughs or opening slits and peaks are formed in a metal film in a sinusoidal pattern which is arranged one dimensionally)

Regarding claim 7 modified Challener discloses all the claim limitations as set forth above as well as the sensor device wherein the periodic structure is provided in a plurality of periodic structures, which have the same or different sizes and/or pitches of their openings and the same or different arrangement directions. (See Challener Fig. 6, Fig. 8, Col. 9 Lines 28-52, and Col. 11 Lines 1-5)

Regarding claim 8 modified Challener discloses all the claim limitations as set forth above as well as the sensor device wherein the periodic structure comprises-at least one recess portion or projection portion provided in the metal film . (See Challener Fig. 4, Bozhevolyni Fig. 2C, which contain recess and projection portions, and Lawrence Col. 1 Lines 28-36 where radiation is re-emited or projected at edge or curve in metal film grating)

Regarding claim 9 modified Challener discloses all the claim limitations as set forth above as well as the sensor device wherein the openings and the at least one recess portion or the projection portion have a substantially circular shape or a substantially polygonal shape, (See Challener Fig. 4, Col. 6 Lines 5-13, and

Bozhevolyni Fig. 2C where openings are polygonal) and their periodic arrangements are two dimensional. (See Challener Fig. 6 and Col. 9 Lines 37-52 and Bozhevolyni [0129] where scattering centers are arranged in a 2D pattern)

Regarding claim 10 modified Challener discloses all the claim limitations as set forth above as well as the sensor device wherein the two-dimensional arrangement is such an arrangement that the recess portion or the projection portion is disposed concentrically around an opening. (See Challener Col. 9 Lines 37-52 where grooves containing a projection portion and opening are formed concentrically)

Regarding claim 11 modified Challener discloses all the claim limitations as set forth above as well as the sensor device wherein the openings and the at least one recess portion or the projection portion have a slit shape, and their periodic arrangements are one-dimensional (See Challener Col. 11 Lines 1-5 and Fig. 8 where grooves or slits have periodic arrangements which are one dimensional and see Lawrence Fig. 1 where figure shows troughs or opening slits and peaks are formed in a metal film in a sinusoidal pattern)

Regarding claim 13 modified Challener discloses all the claim limitations as set forth above as well as the sensor device wherein the metal film is a film of a metal or alloy selected from the group consisting of gold, silver, copper, and aluminum. (See Challener Col. 6 Lines 14-17)

Regarding claim 16 modified Challener discloses all the claim limitations as set forth above as well as the sensor device wherein the device comprises a prism. (See and Challener Col. 1 Lines 37-40)

Modified Challener does not specifically disclose the sensor device wherein the substrate comprises a prism.

Bozhevolyni discloses disclose a sensor device wherein the substrate comprises a prism. (See Bozhevolyni Fig. 1A , [0005])

It would have been obvious to one of ordinary skill in the art at the time of invention to use a substrate as a prism as described by Bozhevolyni in the device of modified Challener because the prisms are known the be used as substrates in sensors utilizing SPP waves and represents a known way of exposing a light beam to said sensor through a prism as is known in the art and required by modified Challener. (See Challener Col. 1 Lines 37-40 and Bozhevolyni Fig. 1A , [0005])

Regarding claim 17 modified Challener discloses all the claim limitations as set forth above as well as a sensor apparatus, comprising: a sensor device according to any one of Claim 1 a light source for irradiating the chemical sensor with light (See Challener 220 Fig. 2 and Col. 5 Lines 64-66) and a photodetector for detecting light transmitted through or reflected from the chemical sensor. (See Challener 260 and 265 Fig. 2 and Col. 5 Lines 64-66)

Regarding claim 18 modified Challener discloses all the claim limitations as set forth above as well as the sensor apparatus, wherein the photodetector comprises a spectroscope. (See Challener Col. 11 Lines 14-21)

3. Claims 19-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Challener et al. (US 5,994,150) in view of Bozhevolnyi et al. (US 2002/0021445) further in view Lawrence et al. (US 6,642,881) as applied to claims 1, 2, 5, 7-11, 13, and 16-18 above, and further in view of Corn et al. (US 2003/0100127).

Regarding claim 19 modified Challener discloses all the claim limitations as set forth above but does not disclose the sensor wherein the photodetector comprises means for detecting light transmitted through a band-pass filter.

Corn et al. discloses a sensor wherein the photodetector comprises means for detecting light transmitted through a band-pass filter. (See Abstract and [0127])

It would have been obvious to one of ordinary skill in the art at the time of invention to use a detector with means for detecting light transmitted through a band-pass filter in the sensor of modified Challener because the detector allows the sensor to optically measure the results of changes in the sensor material on the metal surface of a SPR sensor (See Corn Abstract and [0127]) as required by the sensor of modified Challener. (See Challener Col. 1 Lines 23-37)

Regarding claim 20 modified Challener discloses all the claim limitations as set forth above as well as the sensor apparatus wherein the sensor medium is integrally supported in a micro total analysis system prepared through a semiconductor process. (See Corn [005], Bozhevolnyi [0123], and Challener Col. 11 Lines 30-40 where device is used in sensor applications and can be used in micro total analysis systems such as protein and gene chips and can also be used to monitor multiple substances)

Regarding claim 21 modified Challener discloses all the claim limitations as set forth above as well as the sensor apparatus wherein the sensor medium is integrally supported in a DNA chip prepared through a semiconductor process. (See Corn [005] and Bozhevolnyi [0123] where gene chip is a dna chip and device is used in sensor applications)

Regarding claim 22 modified Challener discloses all the claim limitations as set forth above as well as the sensor apparatus, wherein the sensor medium is integrally supported in a protein chip prepared through a semiconductor process. (See Corn [005] and Bozhevolnyi [0123] where device is used in sensor applications)

Regarding limitations recited in claims 1-22 which are directed to a manner of operating disclosed device, it is noted that neither the manner of operating a disclosed device nor material or article worked upon further limit an apparatus claim. Said limitations do not differentiate apparatus claims from prior art. See MPEP § 2114 and

2115. Further, it has been held that process limitations do not have patentable weight in an apparatus claim. See Ex parte Thibault, 164 USPQ 666, 667 (Bd. App. 1969) that states "Expressions relating the apparatus to contents thereof and to an intended operation are of no significance in determining patentability of the apparatus claim."

Response to Arguments

4. Applicant's arguments with respect to claims 1, 2, 5, 7-11, 13, and 16-22 have been considered but are moot in view of the new ground(s) of rejection.

5. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

6. In response to applicants argument that "the Examiner acknowledged that none of the cited references discloses that the circumference of the metal film sandwiched by two adjacent openings is a substantially integral multiple of a wavelength of the SPP wave. However, the Examiner alleged that since it is known to alter the shape and the pitch of the periodic structure of devices as described in Challener depending on application, one skilled in the art would reasonably be able to alter the periodic structures through routine experimentation and arrive at a configuration with a circumferential length as claimed. Applicants respectfully disagree with this analysis and submit that it is not consistent with the law." It is noted that while the examiner

acknowledged that while no singular reference may disclose the circumference of the metal film sandwiched by two adjacent openings being a substantially integral multiple of a wavelength of the SPP wave a combination of references was used to reject said limitations. Please refer to Pg. 11 of previous office action where the position is taken that in "Lawrence Fig. 1 and Challener Fig. 4 where two indentations or openings sandwich peaks and Lawrence C 4 L 46-55 where amplitude and pitch of grating is a multiple of wavelength and Challener C 6 L 9-11 where grating is square and as such circumference is a multiple of wavelength". To clarify the point: given a grating projection which is square in profile as described by Challener and surrounded by openings as described by Bozhevolnyi, when the amplitude, height, of said grating projection is a substantially integral multiple of a wavelength of a wave as described by Lawrence, the grating projection will inherently have a circumference which is a substantially integral multiple of a wavelength of said wave as all sides of a square have equal length.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Kock et al. (US 5,568,504) discloses a device utilizing surface plasmon polariton waves generated on a metal film.

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to JONATHAN M. HURST whose telephone number is (571)270-7065. The examiner can normally be reached on Mon. - Thurs. 6:30-5:00; Every Fri. off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill Warden can be reached on (571)272-1267. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. M. H./
Examiner, Art Unit 1797

/Jill Warden/
Supervisory Patent Examiner, Art Unit 1797